1600

#9 DMJ 4-25-3

OIPE

ENTERED

RAW SEQUENCE LISTING DATE: 01/15/2003 RG
PATENT APPLICATION: US/10/081,301A TIME: 09:40:44

Input Set : A:\BB-1201 US DIV Corrected Sequence Listing.txt
Output Set: N:\CRF4\01152003\J081301A.raw



<110> APPLICANT: Falco, S. Carl
Cahoon, Rebecca E.
<120> TITLE OF INVENTION: Vitamin B Metabolism Proteins
<130> FILE REFERENCE: BB-1201 US DIV
<140> CURRENT APPLICATION NUMBER: 10/081,301A
<141> CURRENT FILING DATE: 2002-02-20
<150> PRIOR APPLICATION NUMBER: 60/096,342
<151> PRIOR FILING DATE: 1998-08-12
<160> NUMBER OF SEQ ID NOS: 16
<170> SOFTWARE: Microsoft Office 97
<210> SEQ ID NO: 1
<211> LENGTH: 933
<212> TYPE: DNA
<213> ORGANISM: Zea mays
<400> SEQUENCE: 1
atggcgcggc cgccgatcct atccgtcgcg ctgccgtctg acaccggccg tgtgctcagc 60
atccagtccc acaccgtcca ggggtatgtt ggcaacaaat cggccgtctt tcccctgcag 120
ctccttggct ttgatgtgga tccaataaac tctgtacagt tttctaatca tacaggatac 180
ccaacattta gaggtcaggt tcttaatggc aaacagctct gggaccttat tgaaggactg 240
gaggaaaatc agttgcttca ttatacccat ttattaacag gttatatagg ctcagtttcc 300
tttttagata ctgtgctaca agttgttgag aaattgcgat cagttaatcc tgatcttgta 360
tatgtttgtg acccagttct aggtgatgaa ggaaaactat atgttcctca ggaggtaata 420
tctgtttatc aacagaaggt tgttccagtt gcttcaatgc ttacacctaa ccaatttgaa 480
gttgaactac ttactggatt gaggatcacc tccgaagaag atggtttgac agcttgtaat 540
accctccaca gtgccggacc acagaaggtg gttataacta gtgctcttat tgaaggtaag 600
ctgctcctta tcggaagtca caaaaaaaca gaggaacaac agccagaaca atttaagatt 660
gagataccaa agatacctgc atatttcacg ggaactggag atttgacaac tgctctccta 720
ctaggatgga gtaataaata tcctgatagc ctcgagaaag cagcagaact ggcagtttcc 780
agtttgcagg cacttctgaa aagaactgtg gaagactata aaatggccgg cttcgaccca 840
tcgaccagca gcttagagat ccggttgatc caaagccagg acgagatccg aaacccaact 900
gttacatgca aggctgtgaa gtatggaagc tga 933
<210> SEQ ID NO: 2
<211> LENGTH: 310
<212> TYPE: PRT
<213> ORGANISM: Zea mays
<400> SEQUENCE: 2
Met Ala Arg Pro Pro Ile Leu Ser Val Ala Leu Pro Ser Asp Thr Gly
1 5 10 15
Arg Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn
20 25 30
Lys Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Phe Asp Val Asp Pro
35 40 45
Ile Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Arg

RAW SEQUENCE LISTING DATE: 01/15/2003
PATENT APPLICATION: US/10/081,301A TIME: 09:40:44

Input Set : A:\BB-1201 US DIV Corrected Sequence Listing.txt
Output Set: N:\CRF4\01152003\J081301A.raw

```
60      50                  55                  60
62 Gly Gln Val Leu Asn Gly Lys Gln Leu Trp Asp Leu Ile Glu Gly Leu
63  65                  70                  75                  80
65 Glu Glu Asn Gln Leu Leu His Tyr Thr His Leu Leu Thr Gly Tyr Ile
66                  85                  90                  95
68 Gly Ser Val Ser Phe Leu Asp Thr Val Leu Gln Val Val Glu Lys Leu
69             100                 105                 110
71 Arg Ser Val Asn Pro Asp Leu Val Tyr Val Cys Asp Pro Val Leu Gly
72         115                 120                 125
74 Asp Glu Gly Lys Leu Tyr Val Pro Gln Glu Val Ile Ser Val Tyr Gln
75     130                 135                 140
77 Gln Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu
78 145                 150                 155                 160
80 Val Glu Leu Leu Thr Gly Leu Arg Ile Thr Ser Glu Glu Asp Gly Leu
81                 165                 170                 175
83 Thr Ala Cys Asn Thr Leu His Ser Ala Gly Pro Gln Lys Val Val Ile
84             180                 185                 190
86 Thr Ser Ala Leu Ile Glu Gly Lys Leu Leu Leu Ile Gly Ser His Lys
87         195                 200                 205
89 Lys Thr Glu Glu Gln Gln Pro Glu Gln Phe Lys Ile Glu Ile Pro Lys
90     210                 215                 220
92 Ile Pro Ala Tyr Phe Thr Gly Thr Gly Asp Leu Thr Thr Ala Leu Leu
93 225                 230                 235                 240
95 Leu Gly Trp Ser Asn Lys Tyr Pro Asp Ser Leu Glu Lys Ala Ala Glu
96                 245                 250                 255
98 Leu Ala Val Ser Ser Leu Gln Ala Leu Leu Lys Arg Thr Val Glu Asp
99             260                 265                 270
101 Tyr Lys Met Ala Gly Phe Asp Pro Ser Thr Ser Ser Leu Glu Ile Arg
102         275                 280                 285
104 Leu Ile Gln Ser Gln Asp Glu Ile Arg Asn Pro Thr Val Thr Cys Lys
105     290                 295                 300
107 Ala Val Lys Tyr Gly Ser
108 305                 310
110 <210> SEQ ID NO: 3
111 <211> LENGTH: 413
112 <212> TYPE: DNA
113 <213> ORGANISM: Oryza sativa
115 <220> FEATURE:
116 <221> NAME/KEY: unsure
117 <222> LOCATION: (380)
118 <223> OTHER INFORMATION: n = a, c, g or t
120 <220> FEATURE:
121 <221> NAME/KEY: unsure
122 <222> LOCATION: (384)
123 <223> OTHER INFORMATION: n = a, c, g or t
125 <220> FEATURE:
126 <221> NAME/KEY: unsure
127 <222> LOCATION: (388)
128 <223> OTHER INFORMATION: n = a, c, g or t
```

RAW SEQUENCE LISTING DATE: 01/15/2003
PATENT APPLICATION: US/10/081,301A TIME: 09:40:44

Input Set : A:\BB-1201 US DIV Corrected Sequence Listing.txt
Output Set: N:\CRF4\01152003\J081301A.raw

```
    130 <220> FEATURE:
    131 <221> NAME/KEY: unsure
    132 <222> LOCATION: (410)
    133 <223> OTHER INFORMATION: n = a, c, g or t
    135 <400> SEQUENCE: 3
    136 gtttaaacaa gaagatggct tgaaagcttg caatgcgcta catagtgctg gaccgcgaaa  60
    137 ggtggtaata actagtgcac ttattgaaga taagctgctc ctcattggaa gccacaaaaa 120
    138 agcaaaggaa caaccaccag aacaatttaa gattgagata cccaagatac ctgcatattt 180
    139 cacgggcact ggagatttaa caactgccct tctactagga tggagtaata aataccctga 240
    140 taaccttgga gagggcgctg aactggcggt atccatttgc aaggcacccc taaggagaac 300
    141 tgtggaagac tataaaagac tgggtttgac cctccaacca acacctagag atccgcctgg 360
W--> 142 attcaaaacc aaggatgaan tccnaagncc caagatacat gcaagctgtn aaa        413
    144 <210> SEQ ID NO: 4
    145 <211> LENGTH: 136
    146 <212> TYPE: PRT
    147 <213> ORGANISM: Oryza sativa
    149 <220> FEATURE:
    150 <221> NAME/KEY: UNSURE
    151 <222> LOCATION: (127)..(128)..(129)
    152 <223> OTHER INFORMATION: Xaa = any amino acid
    154 <400> SEQUENCE: 4
    155 Phe Lys Gln Glu Asp Gly Leu Lys Ala Cys Asn Ala Leu His Ser Ala
    156   1               5                  10                  15
    158 Gly Pro Arg Lys Val Val Ile Thr Ser Ala Leu Ile Glu Asp Lys Leu
    159             20                  25                  30
    161 Leu Leu Ile Gly Ser His Lys Lys Ala Lys Glu Gln Pro Pro Glu Gln
    162         35                  40                  45
    164 Phe Lys Ile Glu Ile Pro Lys Ile Pro Ala Tyr Phe Thr Gly Thr Gly
    165     50                  55                  60
    167 Asp Leu Thr Thr Ala Leu Leu Leu Gly Trp Ser Asn Lys Tyr Pro Asp
    168 65                  70                  75                  80
    170 Asn Leu Gly Glu Gly Ala Glu Leu Ala Val Ser Ile Cys Lys Ala Pro
    171                 85                  90                  95
    173 Leu Arg Arg Thr Val Glu Asp Tyr Lys Arg Leu Gly Leu Thr Leu Gln
    174             100                 105                 110
W--> 176 Pro Thr Pro Arg Asp Pro Pro Gly Phe Lys Thr Lys Asp Glu Xaa Xaa
    177         115                 120                 125
W--> 179 Xaa Pro Lys Ile His Ala Ser Cys
    180     130                 135
    182 <210> SEQ ID NO: 5
    183 <211> LENGTH: 812
    184 <212> TYPE: DNA
    185 <213> ORGANISM: Glycine max
    187 <220> FEATURE:
    188 <221> NAME/KEY: unsure
    189 <222> LOCATION: (577)
    190 <223> OTHER INFORMATION: n = a, c, g or t
    192 <220> FEATURE:
    193 <221> NAME/KEY: unsure
```

RAW SEQUENCE LISTING DATE: 01/15/2003
PATENT APPLICATION: US/10/081,301A TIME: 09:40:44

Input Set : A:\BB-1201 US DIV Corrected Sequence Listing.txt
Output Set: N:\CRF4\01152003\J081301A.raw

194 <222> LOCATION: (610)
195 <223> OTHER INFORMATION: n = a, c, g or t
197 <220> FEATURE:
198 <221> NAME/KEY: unsure
199 <222> LOCATION: (683)
200 <223> OTHER INFORMATION: n = a, c, g or t
202 <220> FEATURE:
203 <221> NAME/KEY: unsure
204 <222> LOCATION: (687)
205 <223> OTHER INFORMATION: n = a, c, g or t
207 <220> FEATURE:
208 <221> NAME/KEY: unsure
209 <222> LOCATION: (742)
210 <223> OTHER INFORMATION: n = a, c, g or t
212 <220> FEATURE:
213 <221> NAME/KEY: unsure
214 <222> LOCATION: (744)
215 <223> OTHER INFORMATION: n = a, c, g or t
217 <220> FEATURE:
218 <221> NAME/KEY: unsure
219 <222> LOCATION: (746)
220 <223> OTHER INFORMATION: n = a, c, g or t
222 <220> FEATURE:
223 <221> NAME/KEY: unsure
224 <222> LOCATION: (755)
225 <223> OTHER INFORMATION: n = a, c, g or t
227 <220> FEATURE:
228 <221> NAME/KEY: unsure
229 <222> LOCATION: (760)
230 <223> OTHER INFORMATION: n = a, c, g or t
232 <220> FEATURE:
233 <221> NAME/KEY: unsure
234 <222> LOCATION: (769)
235 <223> OTHER INFORMATION: n = a, c, g or t
237 <220> FEATURE:
238 <221> NAME/KEY: unsure
239 <222> LOCATION: (778)
240 <223> OTHER INFORMATION: n = a, c, g or t
242 <220> FEATURE:
243 <221> NAME/KEY: unsure
244 <222> LOCATION: (785)..(786)
245 <223> OTHER INFORMATION: n = a, c, g or t
247 <220> FEATURE:
248 <221> NAME/KEY: unsure
249 <222> LOCATION: (792)
250 <223> OTHER INFORMATION: n = a, c, g or t
252 <220> FEATURE:
253 <221> NAME/KEY: unsure
254 <222> LOCATION: (804)

RAW SEQUENCE LISTING DATE: 01/15/2003
PATENT APPLICATION: US/10/081,301A TIME: 09:40:44

Input Set : A:\BB-1201 US DIV Corrected Sequence Listing.txt
Output Set: N:\CRF4\01152003\J081301A.raw

```
255 <223> OTHER INFORMATION: n = a, c, g or t
257 <400> SEQUENCE: 5
258 gcacgaggag cattttccgg gcacgaaact cgaggaattc gcgcatggcg cctccaatcc  60
259 tctcgctcgc tcttccctcg aacaccggtc gagttctcag cattcaatct cacaccgttc 120
260 aggggtatgt tggtaataaa tccgctgtct tccctctgca actactggga tatgatgtcg 180
261 atccaattaa ttccgtgcag ttttcgaatc atacaggata tccgacgttt aagggtcagg 240
262 ttttgaatgg acagcaactc tgggatctaa tcgaaggcct tgaaggaaat gatttattgt 300
263 tctatactca cttgctaaca ggttatattg gttcagagtc ttttctaaac actgtattgc 360
264 aagttgtcag caaacttcgg tcaacaaacc caggtctttc gtatgtatgt gatccagtga 420
265 tgggtgatga aggaaagctt tatgttcctc aagagctagt atcagtctat cgtgagaagg 480
266 ttgttccagt agcttcaatg ttgactccca accagtttga agcagaacta ctgacaggct 540
W--> 267 ttaggattca gtctgaagga catggccggg aggctgntag gcttctccat gcagctgggc 600
W--> 268 cttcaaaggn cataattaca agtataaata tagacgggat tcttctcctc attggcagtc 660
W--> 269 atccaaaaga aaagggagag ccncccngac aatttaagat tgttattcca aaaataacca 720
W--> 270 gcttatttta cgggaacggg anancncatg actgnattcn tcttggttng agcataanta 780
W--> 271 cccannacaa ancttgagaa tgcngcggaa ct                              812
273 <210> SEQ ID NO: 6
274 <211> LENGTH: 196
275 <212> TYPE: PRT
276 <213> ORGANISM: Glycine max
278 <220> FEATURE:
279 <221> NAME/KEY: UNSURE
280 <222> LOCATION: (178)
281 <223> OTHER INFORMATION: Xaa = any amino acid
283 <220> FEATURE:
284 <221> NAME/KEY: UNSURE
285 <222> LOCATION: (189)
286 <223> OTHER INFORMATION: Xaa = any amino acid
288 <400> SEQUENCE: 6
289 Met Ala Pro Pro Ile Leu Ser Leu Ala Leu Pro Ser Asn Thr Gly Arg
290   1               5                  10                  15
292 Val Leu Ser Ile Gln Ser His Thr Val Gln Gly Tyr Val Gly Asn Lys
293             20                  25                  30
295 Ser Ala Val Phe Pro Leu Gln Leu Leu Gly Tyr Asp Val Asp Pro Ile
296         35                  40                  45
298 Asn Ser Val Gln Phe Ser Asn His Thr Gly Tyr Pro Thr Phe Lys Gly
299     50                  55                  60
301 Gln Val Leu Asn Gly Gln Gln Leu Trp Asp Leu Ile Glu Gly Leu Glu
302 65                  70                  75                  80
304 Gly Asn Asp Leu Leu Phe Tyr Thr His Leu Leu Thr Gly Tyr Ile Gly
305                 85                  90                  95
307 Ser Glu Ser Phe Leu Asn Thr Val Leu Gln Val Val Ser Lys Leu Arg
308             100                 105                 110
310 Ser Thr Asn Pro Gly Leu Ser Tyr Val Cys Asp Pro Val Met Gly Asp
311         115                 120                 125
313 Glu Gly Lys Leu Tyr Val Pro Gln Glu Leu Val Ser Val Tyr Arg Glu
314     130                 135                 140
316 Lys Val Val Pro Val Ala Ser Met Leu Thr Pro Asn Gln Phe Glu Ala
317 145                 150                 155                 160
```

**RAW SEQUENCE LISTING ERROR SUMMARY** DATE: 01/15/2003
PATENT APPLICATION: **US/10/081,301A** TIME: 09:40:45

Input Set : **A:\BB-1201 US DIV Corrected Sequence Listing.txt**
Output Set: **N:\CRF4\01152003\J081301A.raw**

**Please Note:**
**Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.**

Seq#:3; N Pos. 380,384,388,410
Seq#:4; Xaa Pos. 127,128,129
Seq#:5; N Pos. 577,610,683,687,742,744,746,755,760,769,778,785,786,792,804
Seq#:6; Xaa Pos. 178,189
Seq#:9; N Pos. 74
Seq#:10; Xaa Pos. 25
Seq#:11; N Pos. 220,249,353,356,382,388,393,426,430,434,437,473,475,502,506
Seq#:11; N Pos. 519,524,532,536,537,545,549,551
Seq#:12; Xaa Pos. 74,83

VERIFICATION SUMMARY
PATENT APPLICATION: US/10/081,301A

DATE: 01/15/2003
TIME: 09:40:45

Input Set : A:\BB-1201 US DIV Corrected Sequence Listing.txt
Output Set: N:\CRF4\01152003\J081301A.raw

L:142 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:3 after pos.:360
L:176 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:4 after pos.:112
L:179 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:4 after pos.:128
L:267 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5 after pos.:540
L:268 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5 after pos.:600
L:269 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5 after pos.:660
L:270 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5 after pos.:720
L:271 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5 after pos.:780
L:322 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6 after pos.:176
L:414 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9 after pos.:60
L:442 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:10 after pos.:16
L:612 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:180
L:613 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:240
L:614 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:300
L:615 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:360
L:616 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:420
L:617 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:480
L:618 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:540
L:648 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12 after pos.:64
L:651 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12 after pos.:80